monitored with Calypso (Varian) for gating and tracking treatments, and compensated with the PerfectPitch couch (Varian) for tracking. The dose in the moving tumor was measured with Gafchromic EBT2 (ISP) films. Changes in homogeneity indices (ΔHI-99) between the films and the planned dose distributions and their gamma agreement scores using 3%/3mm (G3%/3mm) were evaluated. The film areas receiving more than the planned minimum dose (A-Dmin) were calculated. OAR doses from the treatment plans were compared.

Results: The results for each MMT are summarized in Table 1, giving the median values with 25% and 75% percentiles over the five measurements with different respiration patterns. All techniques achieved a good coverage of the tumor. Median values for A-Dmin were above 99% for all techniques and ITV and MidV concepts showed lower gamma agreement scores (median: 88.9% and 87.7%) compared to gating and tracking (94.2% and 94.8%). For ITV and MidV concepts larger increases in inhomogeneity were found (median: 4.3 and 5.6 percentage points respectively) than for gating and tracking (2.8 and 2.3). Gating and tracking were able to reduce OAR dose in all cases, when compared to IT concept.

Conclusion: Tracking and gating showed a superior agreement with the planned dose distribution and at the same time reduced the dose to OAR in comparison to the passive motion management techniques.

Purpose or Objective: The emergence of hypofractionated protocols in prostate cancer treatment requires a better accuracy in dose delivery because of an increased risk of toxicity to the safe tissues. The aim of this study was to evaluate intrafraction motions of the target volumes for prostate cancer patients imaged with a new transperineal ultrasound (TP-US) device.

Material and Methods: The accuracy of the tracking of the TP-US (Clarity®, Elekta, Stockholm, Sweden) probe was first investigated by comparing the measured positions of a target volume in a phantom with the Clarity device and the simultaneous use of a transmitter based positioning device (RayPilot, Microps Medical, Sweden). Then intra-fraction motions measured with the TP-US were analyzed for 13 prostate patients (426 sessions) and 14 post-prostatectomy patients (438 sessions). The fraction of time that the target volume was displaced by more than 3 mm and 5 mm was calculated for tracking times between 60-420s, for each session and each patient. The mean displacements were also calculated for each direction. Percentages of sessions for which thresholds of 3 mm and 5 mm were exceeded during 15 s and 30 s in each direction were determined.

Results: Differences between TP-US and transmitter based devices were below 1.5 mm for all directions. The observed motions were patients and sessions dependent and increased with the treatment time. During the first minute, 3D displacements above 3 mm were seen 5% and 1.9% of the time, for prostate and post-prostatectomy patients, respectively while they reached 38% and 10.8% of the time after 7 min of treatment. Maximum 3D displacements above 5 mm were observed after 7 min 11.6% and 1.6% of the time for prostate and post-prostatectomy patients, respectively. Mean displacements in AP, SI and LR directions were -0.9±0.8mm, 0.9±0.8mm and -0.3±0.5mm for prostate patients and -0.9±0.5mm, 0.2±0.4mm and 0.1±0.4mm for post-prostatectomy patients. The maximum percentage of sessions for which the prostate and post-prostatectomy volumes exceeded the 3 mm tracking limits for at least 15 s was observed in the AP direction (Table 1). Conversely, minimum